BDCP
Operations Modeling Review

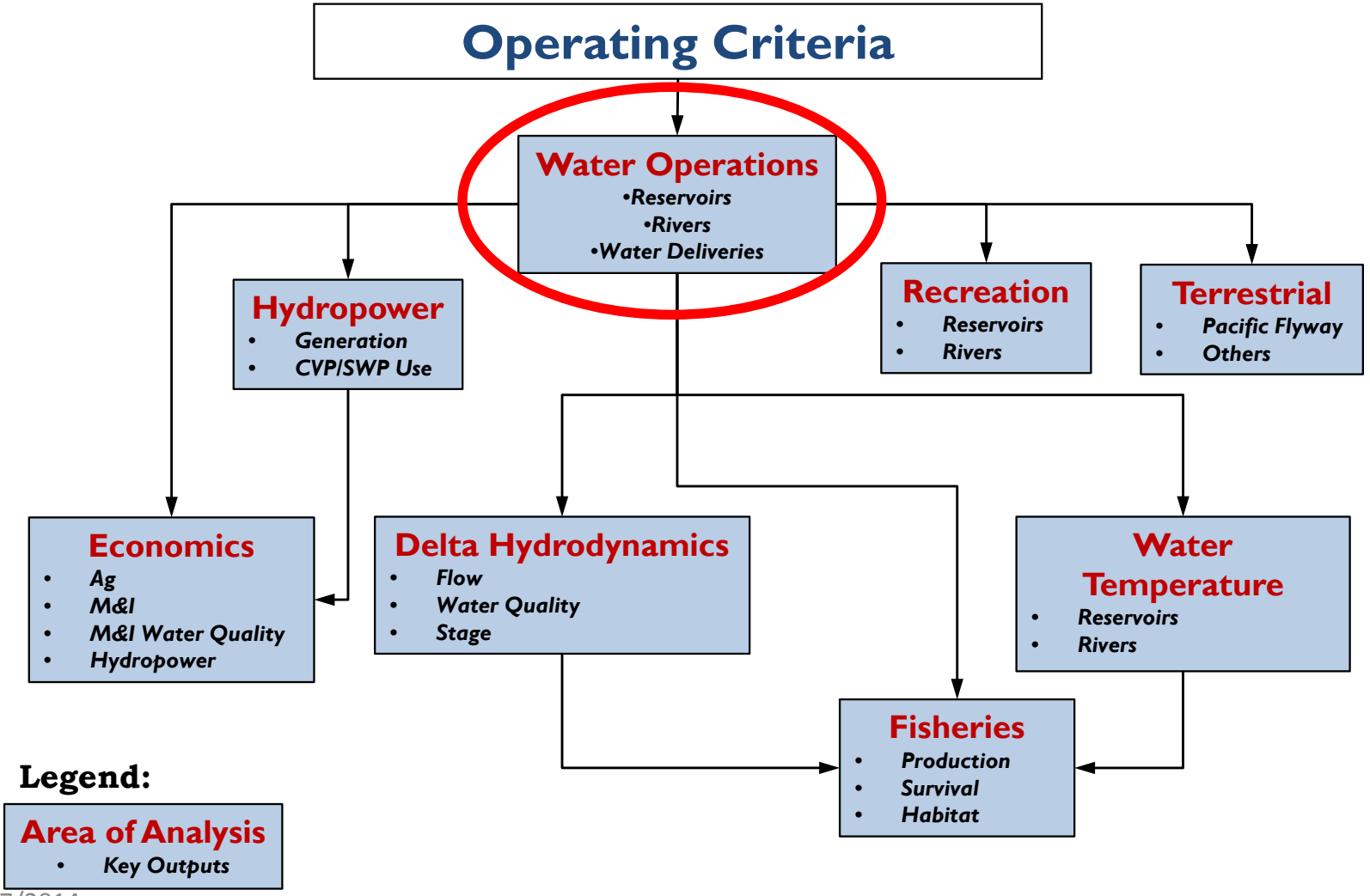
January 17, 2014

MBK ENGINEERS

Topics

- Purpose of this study
- Review of BDCP EIR/EIS operations modeling
- Changes in the projected effects of the BDCP revealed by independent operations modeling
- Conclusions
- Recommendations

Water Operations Modeling is the foundation of many analyses



Approach Taken by BDCP

- Started with models developed in 2009 (immediately after major new regulatory decisions were implemented)

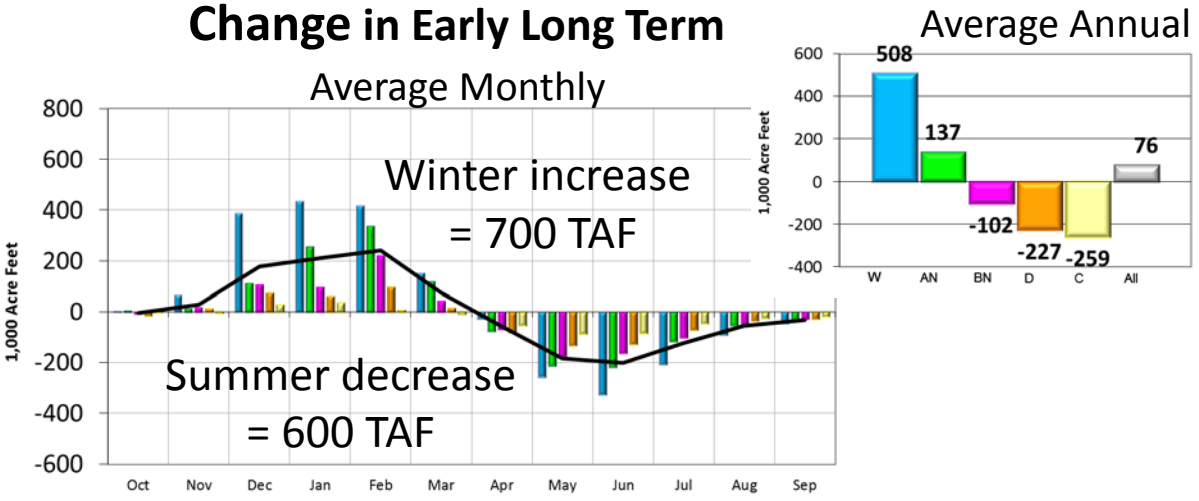
- Incorporated climate change into the No Action Alternative

- Layered on the BDCP facilities and operations

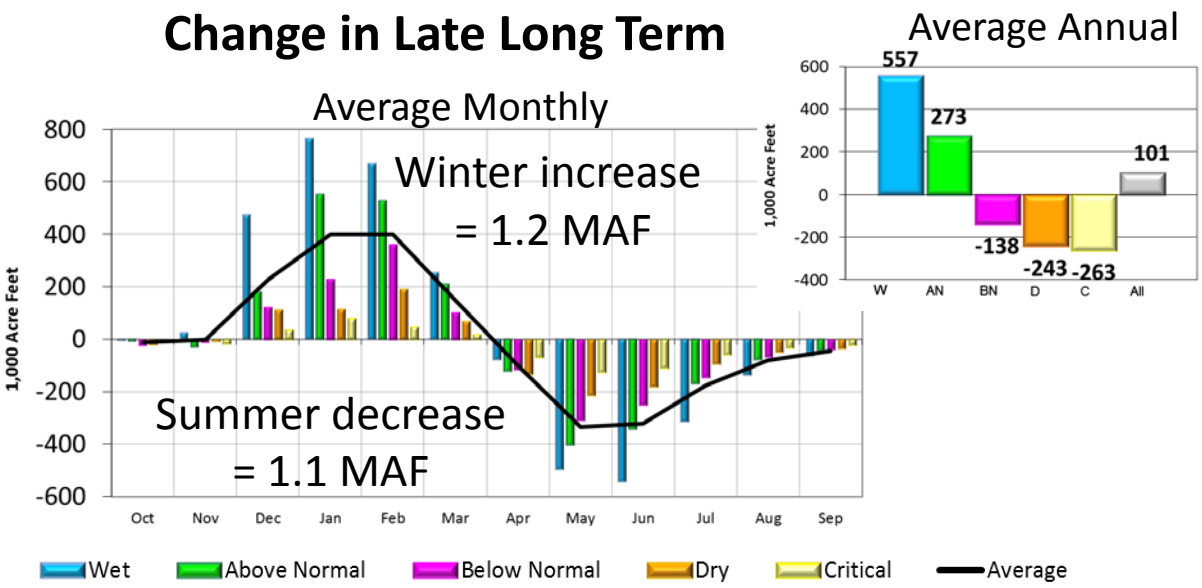
Incorporation of Climate Change

Combined Inflow to Trinity, Shasta, Oroville, and Folsom

Change in Early Long Term



Change in Late Long Term



Existing standards and CVP/SWP operating criteria are not designed for climate change effects of this magnitude

- **Annual dry and critical year decrease in CVP/SWP reservoir inflows of ¼ MAF**
- **Seasonal shifts of ½ MAF**

Climate change was incorporated into model without reasonable adaptation measures producing unrealistic CVP/SWP operations

Incorporation of Climate Change Contains Errors

- For example, inflow to Millerton Lake (from the upper San Joaquin River) is projected to *decrease*, yet BDCP model incorrectly determines that storage levels will *increase* as much as 100,000 AF.
- Overestimation of storage levels misrepresents Millerton flood control operations and thus misstates flow on the lower San Joaquin River.
- Potentially causes problems throughout system
  - Misrepresents Delta hydrodynamics
  - May overstate the water available in San Luis Reservoir
- This error is in all scenarios that include climate change, including all BDCP with project scenarios.

Map

Approach Taken by Independent Modelers

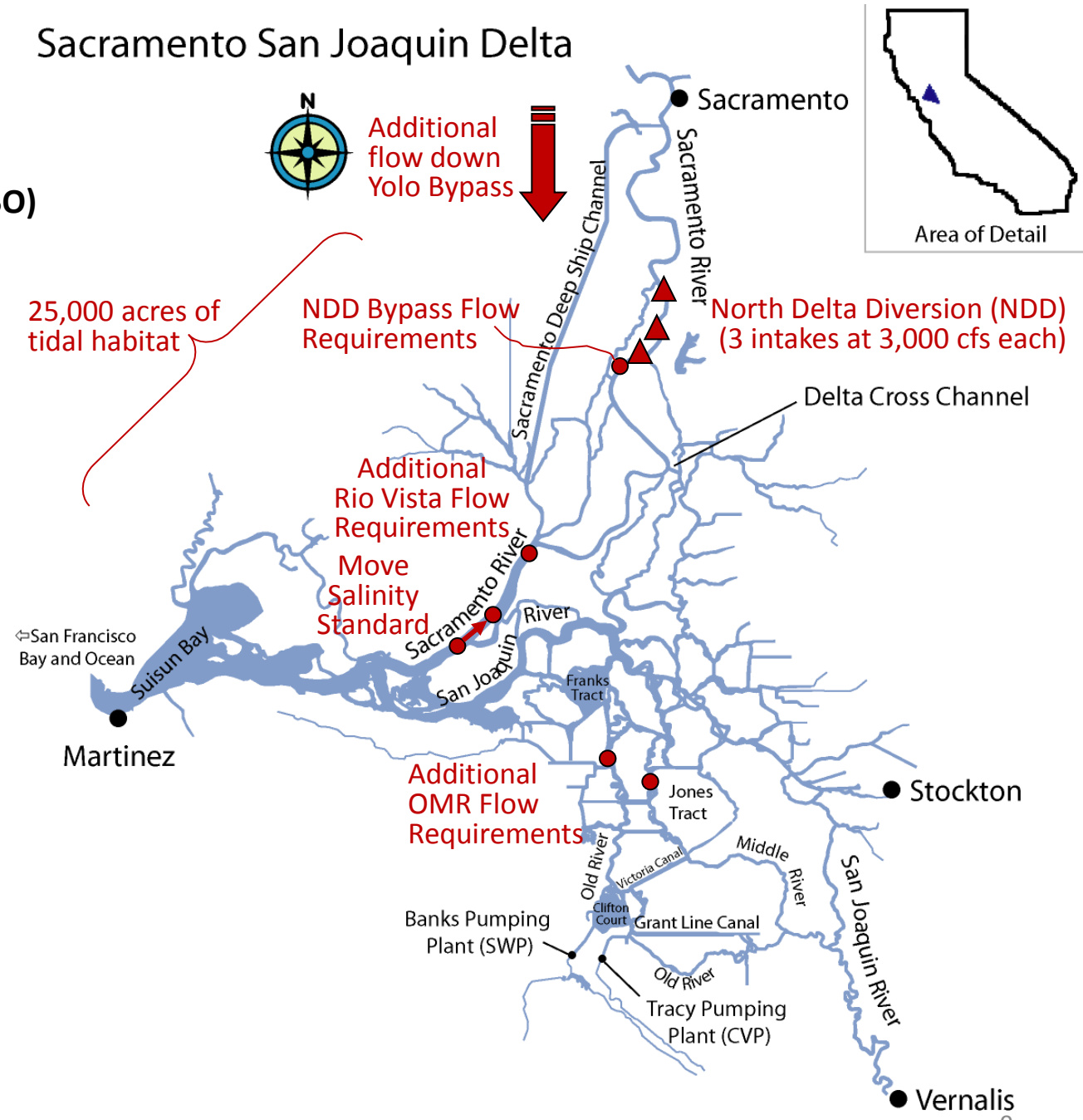
- Started with models developed in 2013 (includes many fixes to the 2009 models)
- Did not incorporate climate change
- Changed assumptions and operations based on real-world data
- Coordinate with experts
- Layered on the BDCP facilities and operations

CalSim II
Independent Modeling Assumptions

- 2013 SWP Delivery Reliability Report
  - Without climate change
- Additional changes
  - Feather River rice decomposition demand
  - CVP demand refinement
  - San Joaquin Basin operations update
  - Others
- BDCP operations logic
  - CVP/SWP San Luis rule curves
  - Water supply allocation logic
  - Cross channel gate operation logic
  - Daily disaggregation
  - Others

BDCP

Alternative 4,
Evaluated Starting Operations (ESO)
aka Operational Scenario H3
[existing X2 outflow criteria]



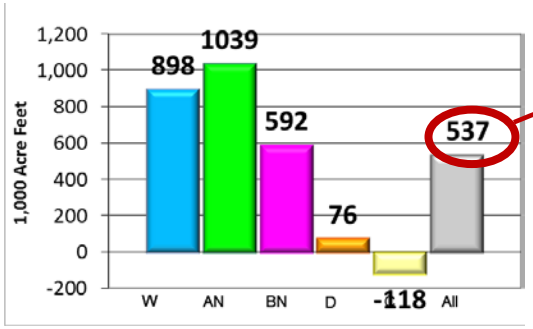
High Outflow Scenario

- Requires increased spring outflow
- BDCP Modeled as being met primarily by SWP releases – this is unrealistic
  - DWR and Reclamation acknowledge COA debt must be repaid
  - NMFS indicated that flow should not come from Shasta or Folsom in order to protect cold water pools (i.e., no upstream COA adjustment)
  - Water transfer program to meet increased requirement is problematic (very little springtime diversions available to provide source of transfer, therefore must be met from CVP or SWP reservoirs)
- **There are no defined operating criteria for this scenario**

Annual Change in Delta Diversions

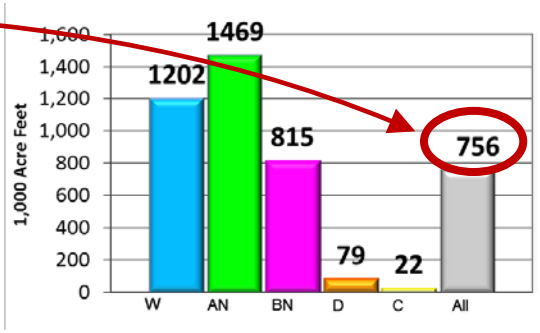
BDCP EIRS Modeling

Alt 4 ELT minus NAA ELT



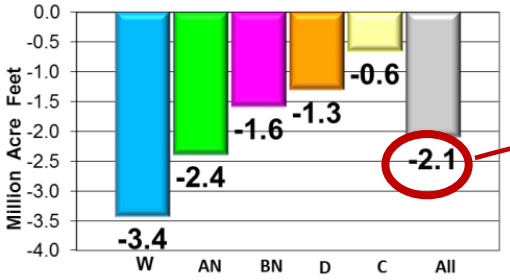
Independent Modeling

Alt 4 minus FNA



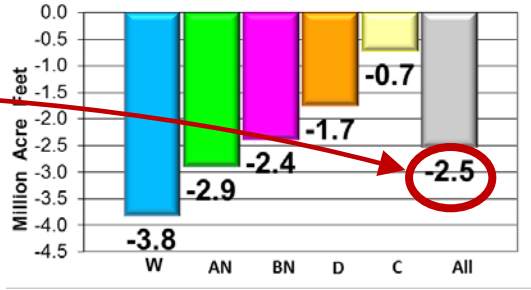
Total Exports

200 TAF increase



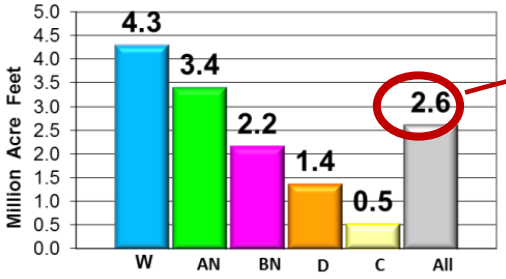
Through Delta

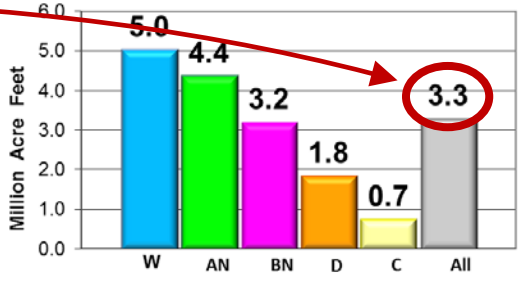
466 TAF decrease



Through North Delta Diversion

686 TAF increase





Annual Change in CVP/SWP Deliveries

BDCP EIRS Modeling

Alt 4 ELT minus NAA ELT

	CVP NOD	CVP SOD
All Years	15	94
W	1	72
AN	17	211
BD	22	158
D	15	49
C	33	12

170 TAF Increase

CVP

South of Delta

Independent Modeling

Alt 4 minus FNA

	CVP NOD	CVP SOD
All Years	2	262
W	0	316
AN	10	506
BD	18	368
D	-13	79
C	4	32

	SWP Total
All Years	408
W	731
AN	803
BD	571
D	-111
C	-177

40 TAF Increase

SWP

	SWP Total
All Years	450
W	763
AN	744
BD	644
D	1
C	-109

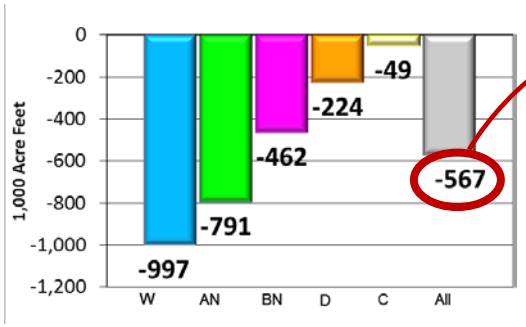
Change in Delta Outflow

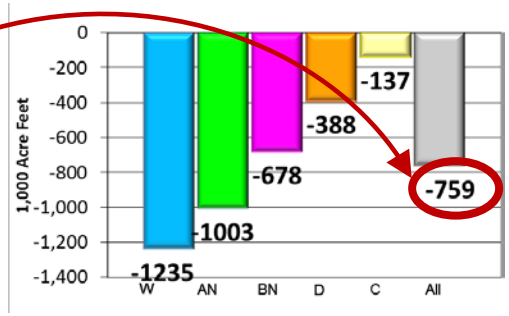
BDCP EIRS

Annual Average

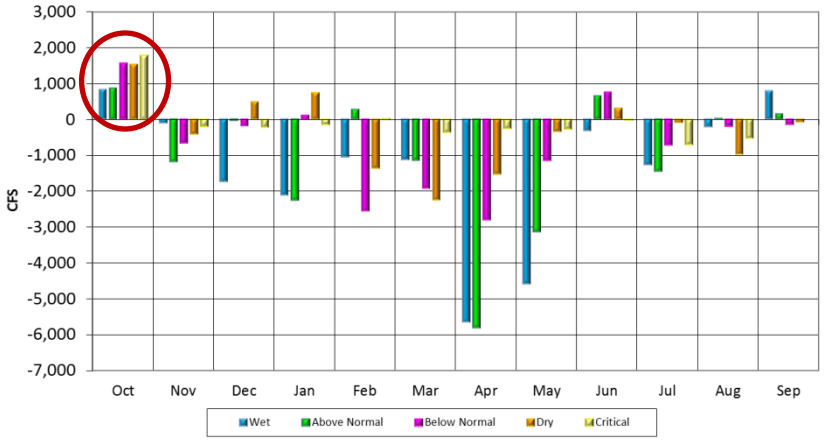
About 200 TAF Decrease

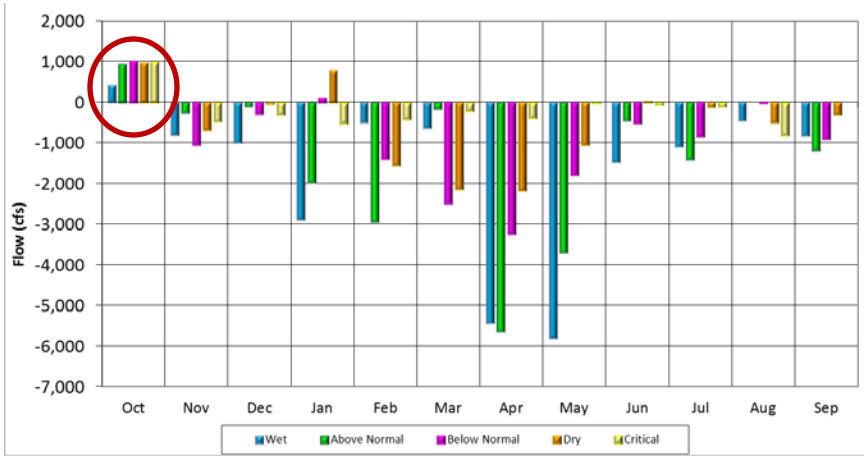
Independent Modeling





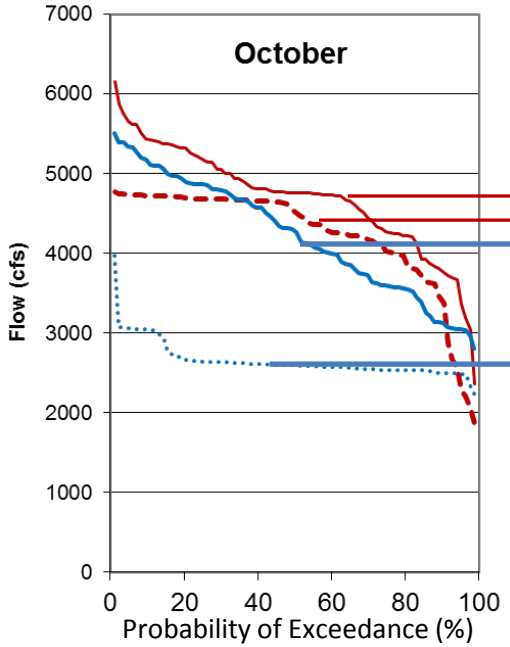
Monthly Average





Cross Channel and Georgiana Slough Flow

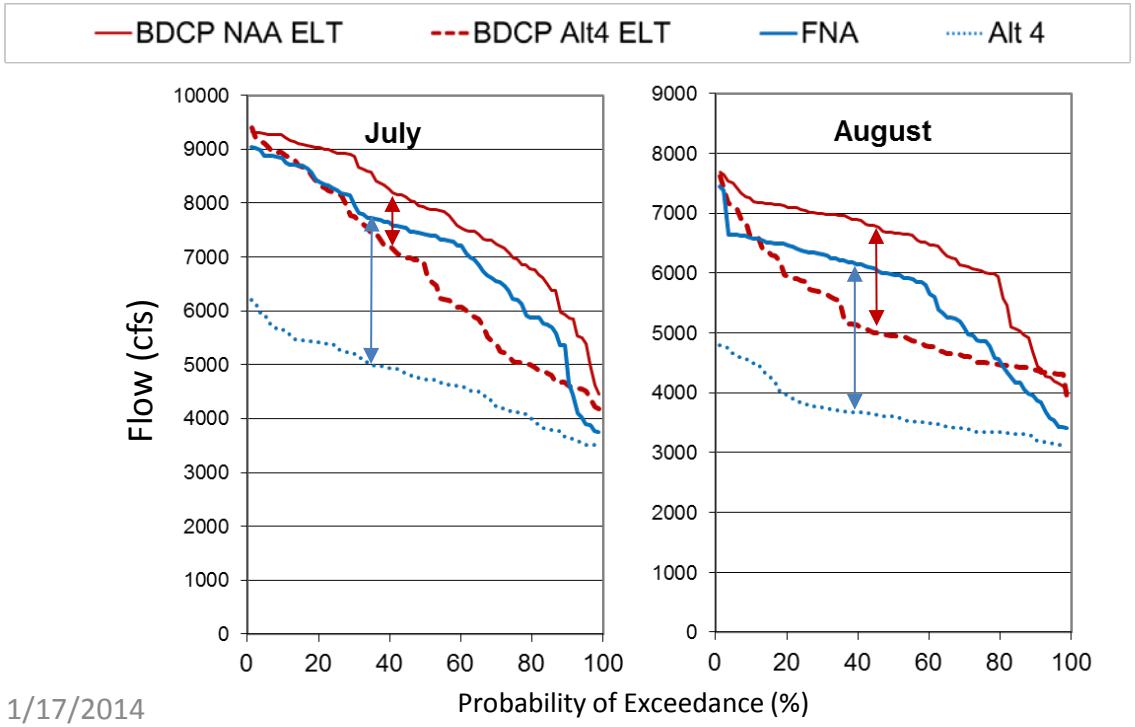
[Map]



October difference in Sacramento River Flow to Central Delta

BDCP EIRS Modeling

Independent modeling shows larger decrease in flow entering central Delta due to gate closure and higher NDD with lower Sacramento River inflow to the Delta

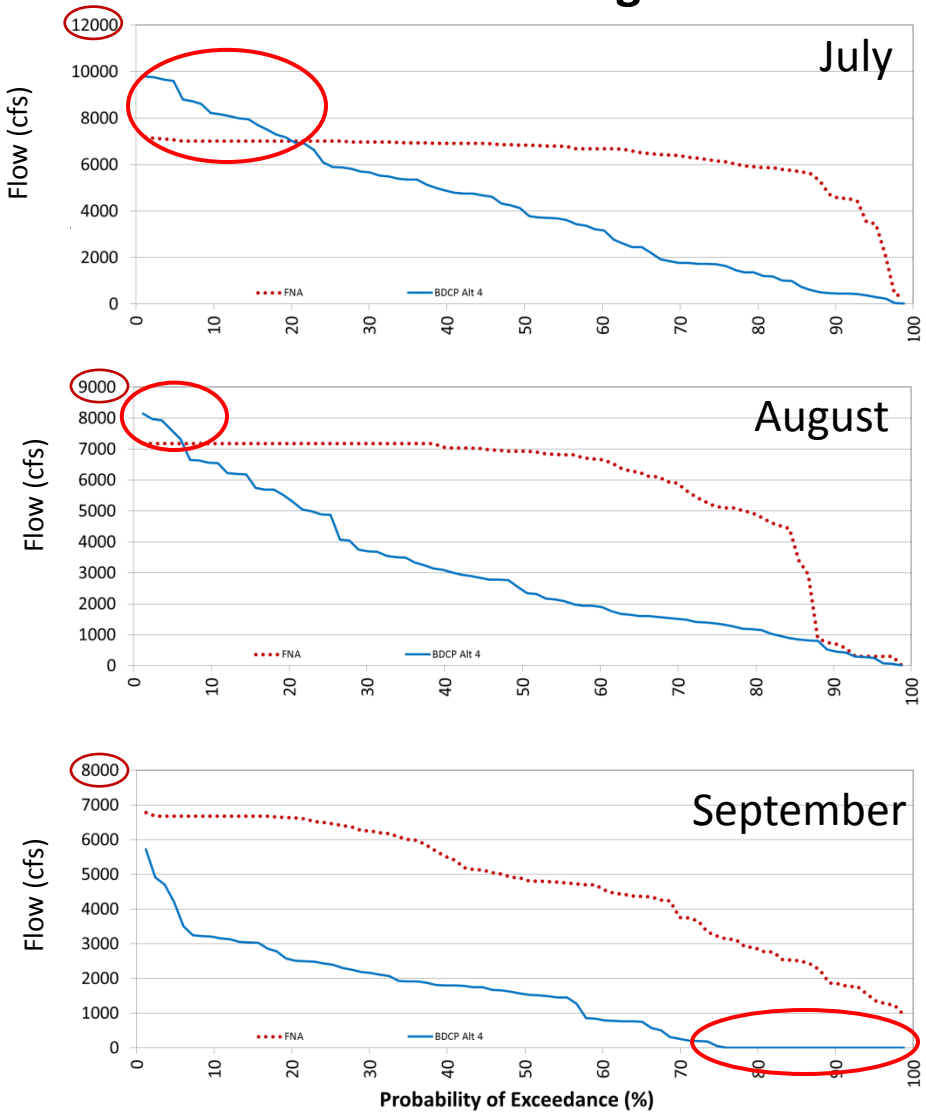


July and August difference in Sacramento River Flow to Central Delta

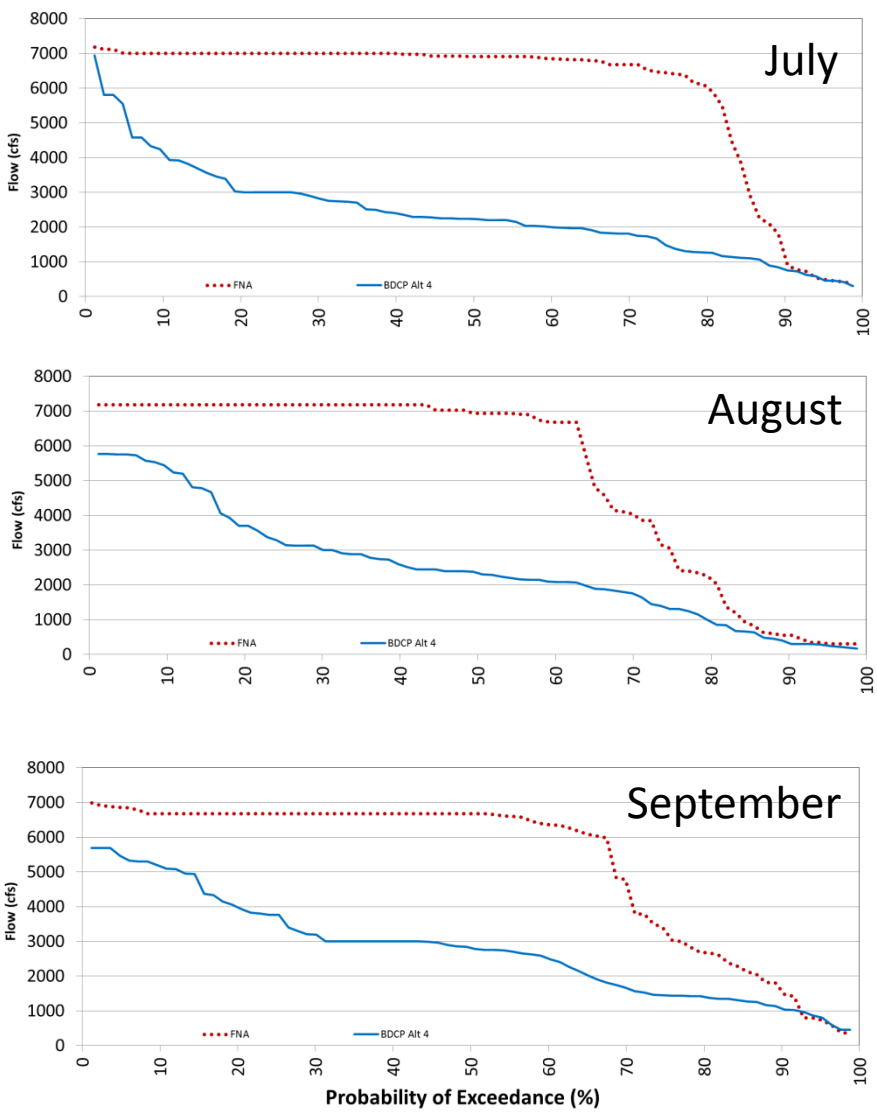
Independent modeling shows larger decrease in flow entering central Delta due higher NDD with lower Sacramento River inflow to the Delta

Through Delta Export at Banks

BDCP Modeling



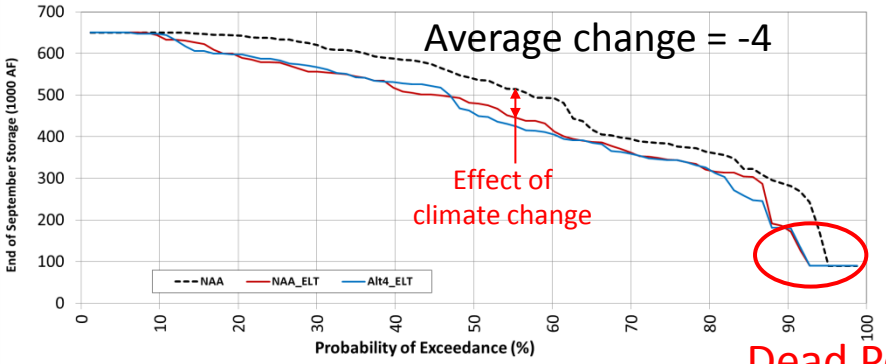
Independent Modeling



Folsom Reservoir

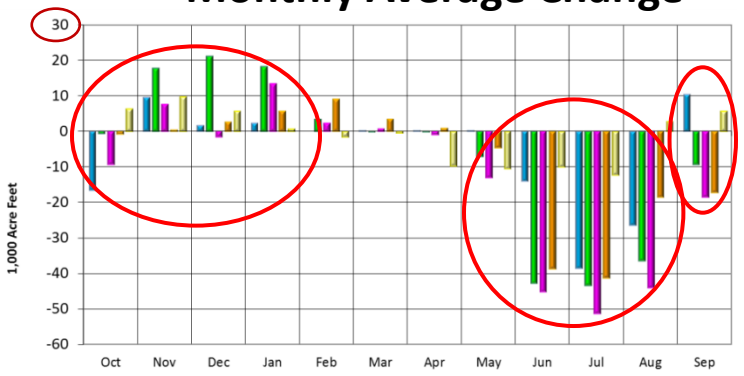
BDCP EIRS

End of September Storage



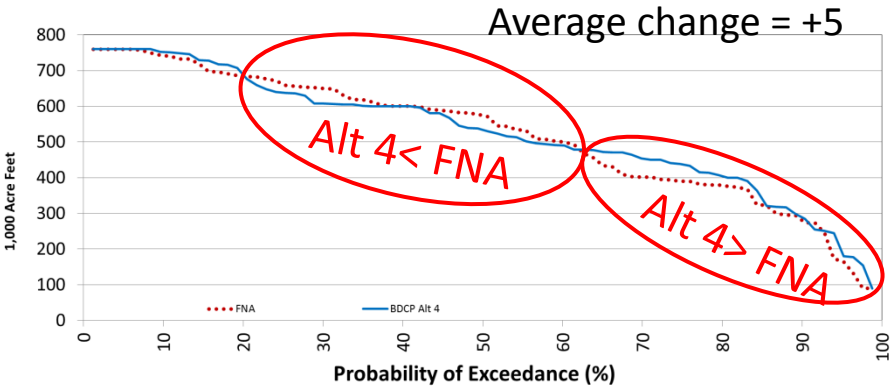
Dead Pool

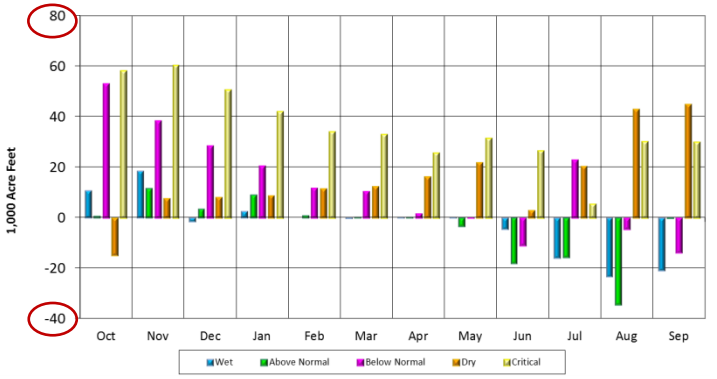
Monthly Average Change



Increase Spring/Summer Drawdown

Independent Modeling



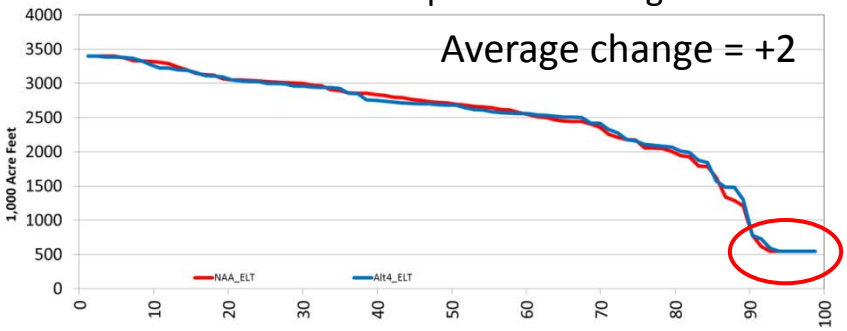


Higher dryer year storage, Lower wetter year storage

Shasta Reservoir

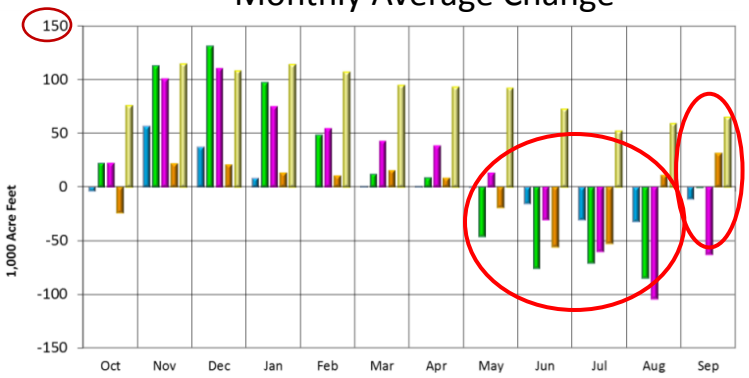
BDCP EIRS

End of September Storage



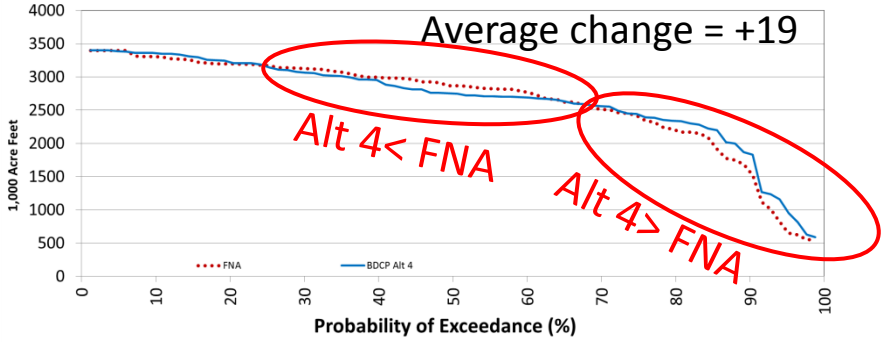
Dead Pool

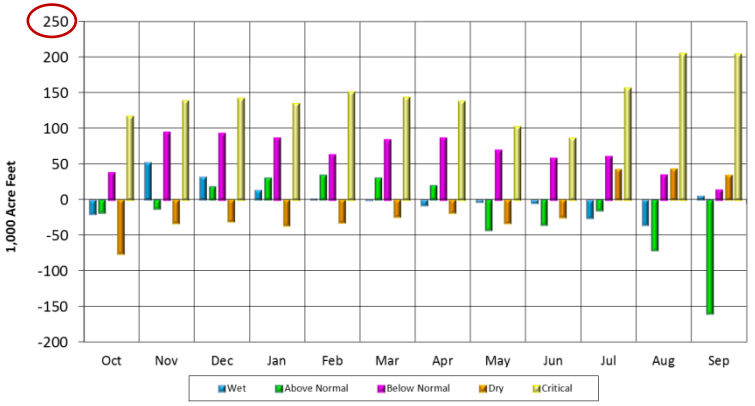
Monthly Average Change



Increase Spring/Summer Drawdown

Independent Modeling





Higher dryer year storage, Lower wetter year storage

Conclusions

- Incorporation of climate change contains errors and does not incorporate adaptation measures.
- BDCP's "High Outflow Scenario" is not sufficiently defined for analysis.
- BDCP's simulated operation of the dual conveyance, coordinating proposed North Delta diversion facilities with existing south Delta diversion facilities, is inconsistent with the project description.
- BDCP models do not accurately reflect anticipated changes in CVP and SWP operations with BDCP.

Conclusions – Cont'd

Independent modeling of the BDCP revealed differences in CVP and SWP operations and water deliveries from the analysis disclosed for the Draft EIR/EIS

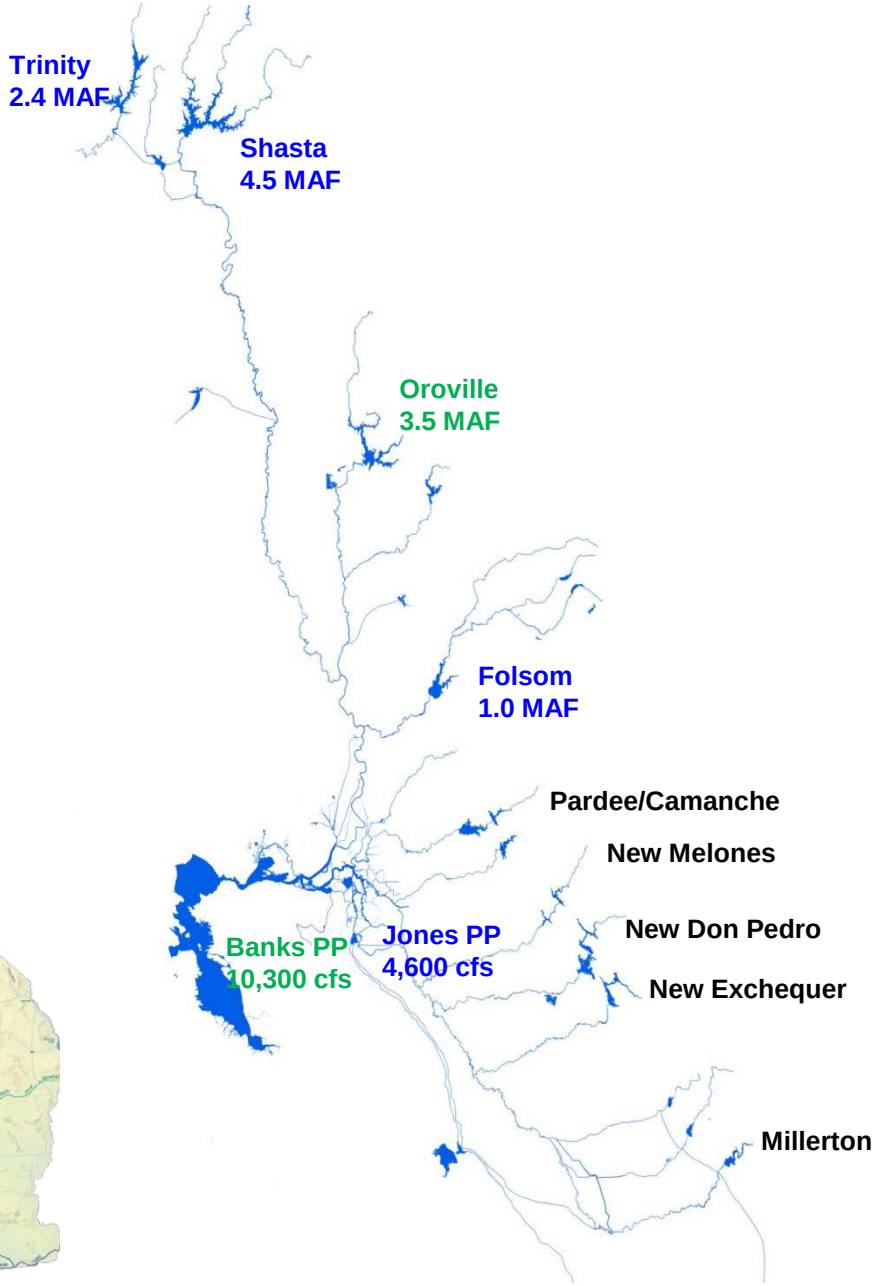
- Total exports increase about 200 TAF/yr more than revealed in BDCP EIR/EIS (41% increase)
  - SWP gets about 20% of this additional supply.
  - Remainder of additional supply is allocated to CVP.
- Delta outflow would decrease by about 200 TAF/yr compared to the amount indicated in the Draft EIR/EIS (34% decrease)
- The BDCP modeling does not accurately reflect the location of the diversions that the SWP and CVP will make from the Delta:
  - about 680 TAF/yr more than what was disclosed in the BDCP Draft EIRS would be diverted from the proposed North Delta intake.
  - about 460 TAF/yr less than what is projected in the BDCP Draft EIRS would be diverted from the existing South Delta intakes.

Recommendations

- Review of BDCP EIR/EIS and BDCP should keep in mind that the underlying analytical tools are flawed.
- BDCP EIR/EIS modeling needs refinement to depict how the system may operate under BDCP:
  - Operating plan should be developed
  - North Delta bypass flows should be refined
  - Implementation of OMR criteria should be reviewed
- Refined modeling results should be used to conduct further analyses, to determine changes to Delta hydrodynamics, water quality, river temperature, hydropower, water levels, etc.
- Effects of climate change and tidal habitat should be examined by sensitivity analyses.

Questions


North Lahontan
Sacramento River
San Joaquin River
Tulare Lake
Central Coast
South Lahontan
Colorado River
South Coast


Trinity
2.4 MAF
Shasta
4.5 MAF
Oroville
3.5 MAF
Folsom
1.0 MAF
Pardee/Camanche
New Melones
New Don Pedro
New Exchequer
Jones PP
4,600 cfs
Banks PP
10,300 cfs
Millerton